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METHOD OF EXTENDING MEAT

[Shokuniku no Zōryō Hōhō]

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[Claims]

[Claim 1] A method of extending meat characterized in that the outflow of drippings is prevented and the meat is extended by the injection of a salt, an alkali, and a thickening stabilizer into the meat.

[Claim 2] The method of extending meat of claim 1 wherein one or more from among said salt, said alkali, and said thickening stabilizer is injected in solution form either individually or as a mixture.

[Claim 3] The method of extending meat of claim 1 or 2 wherein said salt is an alkali metal or alkaline earth metal chloride, said alkali is an alkali metal carbonate or phosphate, and said thickening stabilizer is a natural polymer or starch-based or cellulose-based natural polymer derivative.

[Claim 4] The method of extending meat of any of claims 1 to 3 wherein said alkali metal or alkaline earth metal chloride is NaCl, KCl, CaCl₂, or MgCl₂; said alkali metal carbonate or phosphate is NaHCO₃, Na₂CO₃, KHCO₃, NH₄HCO₃, monosodium phosphate, disodium phosphate, trisodium phosphate, sodium pyrophosphate, sodium polyphosphate, potassium pyrophosphate, sodium hexametaphosphate, potassium metaphosphate, or sodium

¹ Numbers in the margin indicate pagination in the foreign text.

metaphosphate, and said natural polymer or said starch-based or cellulose-based natural polymer derivative is a seaweed extract, seed mucilage, resinous tacky material, or microbe-produced tacky material.

[Claim 5] The method of extending meat of any of claims 1 to 3 wherein said salt is incorporated at a solution concentration of 0.5 to 3 mol/kg, said alkali at a solution concentration of 0.1 to 0.5 mol/kg, and said thickening stabilizer at a weight ratio of 0.1 to 0.5 relative to the quantity of meat.

[Claim 6] The method of extending meat of any of claims 1 to 4 wherein seasonings, spices, fragrance materials, masking agents, fats, oils, albumin, or animal and plant proteins are incorporated as supplementary materials.

[Claim 7] The method of extending meat of any of claims 1 to 5 wherein the quantity of the processed meat is extended by 25 to 150 percent relative to the quantity of starting material meat.

[Detailed Description of the Invention]

[0001]

[Industrial Field of Application] The present invention relates to methods of extending meat, and more particularly, to methods of extending meat in which the quantity of meat can be increased in processed meat and the outflow of drippings can be prevented during storage and thawing.

[0002]

[Prior Art] In the past, the following methods have been used to extend the meat of domestic animals and fish.

[0003] For example, when manufacturing ham or fish ham, the starting material meat is salted by sprinkling on table salt and then exposed to water to remove the salt. A pickling solution is then injected to obtain the finished product.

[0004] Alternatively, a low-concentration solution is injected and kneading is conducted for an extended period until the texture of the meat becomes pastelike to obtain a finished product. Fish sausage and the like are made by grinding up the meat of fish and adding pieces of meat or the like.

[0005] These prior art methods require long periods of time. Further, for products such as fish sausage that can be finished in short periods, it is necessary to grind the starting material meat, and laborious steps are required.

[0006] Currently, there are few attempts being made to extend shaped meat, with the exception of injecting pickling solutions into hams and fish hams.

[0007] That is, in the techniques up to this point, although a certain degree of extension has been achieved by injecting pickling solution into shaped meat, this cannot be considered effective extension because of the drawback whereby most of the pickling solution that has been injected flows out with drippings during storage and thawing of the processed meat.

[0008]

[Problems to Be Solved by the Invention and Means of Solving the Problems] Accordingly, to overcome the drawbacks of prior art, the present inventors conducted extensive research, resulting in the discovery that the addition of prescribed quantities of salts, alkalis, and specified thickening stabilizers permits the extension of the shaped meat itself, and prevents flowing out with drippings during storage or thawing; the present invention was devised on this basis. Accordingly, the present invention has for its object to provide a method of extending meat that is capable both of extending meat and preventing the outflow of drippings.

[0009] To achieve this object, the present invention provides a method of extending meat where one or more from among the salt, alkali, and thickening stabilizer is injected in solution form, either individually or as a mixture.

[0010] As a preferred mode of the present invention, in the method of extending meat of the present invention, an alkali metal or alkaline earth metal chloride is employed as the salt; a alkali metal carbonate or phosphate is employed as the alkali, and a natural polymer or starch-based or cellulose-based natural polymer derivative is employed as the thickening stabilizer./3

[0011] In a further preferred mode of the method of extending meat of the present invention, NaCl, KCl, CaCl₂, or MgCl₂ is employed as the alkali metal or alkaline earth metal chloride;

NaHCO_3 , Na_2CO_3 , KHCO_3 , NH_4HCO_3 , monosodium phosphate, disodium phosphate, trisodium phosphate, sodium pyrophosphate, sodium polyphosphate, potassium pyrophosphate, sodium hexametaphosphate, potassium metaphosphate, or sodium metaphosphate is employed as the alkali metal carbonate or phosphate; and a seaweed extract, seed mucilage, resinous tacky material, or microbe-produced tacky material is employed as the natural polymer or starch-based or cellulose-based natural polymer derivative.

[0012] In yet another preferred mode of the meat extending method of the present invention, the salt is incorporated at a solution density of from 0.5 to 3 mol/kg, the alkali at a solution concentration of from 0.1 to 0.5 mol/kg, and the thickening stabilizer at a weight ratio of 0.1 to 0.5 relative to the quantity of meat.

[0013] In yet another preferred mode of the meat extending method of the present invention, seasonings, spices, fragrance materials, masking agents, fats, oils, albumin, or animal and plant proteins are incorporated as supplementary materials.

[0014] In yet another preferred mode of the meat extending method of the present invention, the quantity of the processed meat is extended by 25 to 150 percent relative to the quantity of starting material meat.

[0015]

[Modes of Implementing the Invention] The method of extending meat of the present invention will be described through a first implementation mode.

[0016] The present invention is not limited to the implementation modes described below; to the extent that they do not depart from the spirit or scope of the present invention, modifications and improvements fall within the scope of the present invention.

[0017] The method of extending meat of the present invention consists of injecting a salt, alkali, and thickening stabilizer into meat.

[0018] Examples of the meats employed in the method of extending meat of the present invention are the meats of domestic animals and fish. Among domestic animals and fish, the use of shaped meat is particularly desirable. Examples of the meats of domestic animals are animal meats such as beef, pork, horse, mutton, and boar, and fowl meats such as chicken. Fish meats include both saltwater and freshwater fish; examples of saltwater fish are fish of unique color, such as Alaska pollack, hoki, white salmon, and porgy; red-meat fish such as tuna and swordfish; blue-meat fish such as sardines, mackerel, saurel, and saury; and freshwater fish such as regular carp and crucian carp.

[0019] Refrigerated, frozen, and semi-frozen meat can be employed. The use of shaped meat is particularly desirable; examples are fish and meat that have been filleted and cleaned in

round, semiround, dressed, bundle-dressed, chunk, block, or steak form.

[0020] Examples of salts that can be employed in the method of extending meat of the present invention are alkali metal and alkaline earth metal salts such as NaCl, KCl, CaCl₂, and MgCl₂. Examples of alkalis that can be employed are alkali metal carbonates and phosphates such as NaHCO₃, Na₂CO₃, KHCO₃, NH₄HCO₃, monosodium phosphate, disodium phosphate, trisodium phosphate, sodium pyrophosphate, sodium polyphosphate, potassium pyrophosphate, sodium hexametaphosphate, potassium metaphosphate, and sodium metaphosphate. Both the above salts and alkalis may be employed singly or combined into mixtures for use.

[0021] Examples of the thickening stabilizers employed in the present invention are natural polymers and starch-based or cellulose-based natural polymer derivatives. Examples of natural polymers are seaweed extracts such as carrageenan, sticky exudates of seeds such as guar gum, resinous tacky materials such as gum arabic, and microbe-produced tacky materials such as xanthan gum.

[0022] Examples of starch-based and cellulose-based natural polymer derivatives are phosphoric acid starch and methyl cellulose, respectively. These thickening stabilizers may also be employed singly or combined into mixtures for use.

[0023] In the method of extending meat of the present invention, extending components in the form of a salt, alkali, and

thickening stabilizer are employed in the form of solutions. Each of the extending components may be employed as separate solution, or a mixture of one or more of the same may be employed as a solution. A single solution containing all of the extending components is preferred for efficiency.

[0024] The solution may be prepared by dissolving the salt, alkali, and thickening stabilizer in a prescribed quantity of water. Drippings from starting material meats containing seasonings and other meats may also be added. The salt concentration in the solution is normally from 0.5 to 3 mol/kg, desirably from 1.5 to 3 mol/kg, and preferably from 2 to 3 mol/kg. The alkali concentration in the solution is normally from 0.1 to 0.5 mol/kg, desirably from 0.2 to 0.4 mol/kg, and preferably from 0.3 to 0.4 mol/kg. And the thickening stabilizer is normally incorporated in a weight ratio of from 0.1 to 0.5, desirably from 0.2 to 0.4, and preferably from 0.3 to 0.4 relative to the weight of the meat. /4

[0025] Supplementary materials commonly employed in food processing may be added to the solution. Examples of such supplementary materials are seasonings, spices, fragrance materials, masking agents, fats, oils, albumin, and animal and plant proteins. The method of extending meat of the present invention consists of injecting this solution into a starting material meat.

[0026] This injection is conducted according to methods that are commonly employed in the field of processed meat manufacturing.

[0027] That is, in the method of extending meat of the present invention, the weight of the processed meat is made from 25 to 150 percent, preferably 30 to 80 percent greater than the weight of the starting material meat.

[0028] Thus, in the present invention, a ratio of solution unachievable by prior art is injected into the starting material meat to increase the weight of the processed meat. The specific mechanism behind this is unclear; however, the use of a solution of a prescribed ratio of salt and alkali is thought to impart a salting-in effect and a substantial gelling capability, and the further addition of the thickening stabilizer is thought to enhance the binding property of the meat tissue. Accordingly, the method of the present invention greatly increases the water retention property of processed meat, causes the injected solution to be stored, and strongly prevents the outflow of drippings during thawing and cooking.

[0029] Further, in the method of extending meat of the present invention, following the injection of the solution extending components into the starting material meat, and following vibration, tumbling, or the like by the usual methods, aging or the like can be conducted to effectively disperse the extending components throughout the meat. The aging method further promotes the salting-in effect and gelling capability achieved by

adding the extending components, further enhances the water retention capability of the processed meat obtained, and further inhibits the outflow of drippings.

[0030]

[**Embodiments**] The present invention is described in greater detail below through embodiments.

[0031] (Embodiment 1) Australian-raised frozen beef strip loin was thawed, yielding 3,496 g. The drip flow-out rate was 2.0 percent. A 2,532 g quantity of solution obtained by adding 20.6 g of sorbitol, 34.2 g of albumin, and 10.2 g of xanthan gum to a mixed solution of 496 g of table salt solution with a concentration of 1 mol/kg and 1,475 g of a sodium bicarbonate solution with a concentration of 0.15 mol/kg was injected into the beef. The meat was then tumbled for 30 min, aged for 24 hours, and frozen. The injection rate, that is, extension rate in this case was 53.5 percent.

[0032] When the beef thus processed was fried for four minutes in a frying pan, the cooking yield was 91.6 percent and the salt concentration was 0.62 percent. Even with cooking, the amount of drippings that flowed out was extremely small and of a degree that could be ignored. The cooked product chewed well and exhibited good properties.

[0033] (Comparative Example 1) Frozen Australian strip loin was thawed naturally, yielding 2,455 g.

[0034] The drip flow-out rate was 2.3 percent. A 1,460 g quantity of solution obtained by dissolving 14.7 g of sorbitan and 24.5 g of albumin in a mixed solution of 356 g of table salt solution with a concentration of 1 mol/kg and 1,057 g of sodium bicarbonate solution with a concentration of 0.15 mol/kg was injected into the meat. Tumbling was then conducted for 30 min and the meat was aged for 24 hours and frozen. The injection rate, that is, extension rate in this case was 18.2 percent.

[0035] The product thus obtained was thawed and fried for 4 min in a frying pan, the cooking yield was 75.6 percent and the salt concentration was 0.30 percent. This cooked product was mushy and did not chew well.

[0036] (Embodiment 2) New Zealand hoki was naturally thawed, yielding 1,300 g. The drip flow-out rate was 2.5 percent. A 624.1 g quantity of solution obtained by dissolving 6.5 g of sorbitol and 3.9 g of guar gum in a mixed solution of 52.2 g of table salt solution with a concentration of 3 mol/kg and 624.1 g of sodium bicarbonate with a concentration of 0.1 mol/kg was injected into the hoki. Subsequently, the product was vibrated for 5 minutes and the frozen and stored. The injection rate, that is, extension rate, in this case was 36.2 percent.

[0037] When the product was thawed and cooked for four minutes in a frying pan, the cooking yield was 89.2 percent. During thawing of the product, there was so little outflow of drippings as to be

negligible. The salt concentration in the cooked product was a low 0.52 percent, the meat was soft, and there was no fish odor.

[0038] (Embodiment 2) New Zealand hoki was naturally thawed, yielding 1,550 g. The drip flow-out rate during natural thawing was 2.8 percent. An 836 g quantity of solution obtained by dissolving 15.5 g of albumin and 7.7 g of sorbitol in a mixed solution of 62.3 g of table salt solution with a concentration of 3 mol/kg and 744.2 g of sodium bicarbonate with a concentration of 0.1 mol/kg was injected into the hoki. Vibration was then conducted for five minutes and the product was frozen and stored. The injection rate, that is, the extension rate, in this case was 12.3 percent.

[0039] Next, when the product was thawed and fried in a frying pan for four minutes, the cooking yield was 72.2 percent. The drip flow-out rate during thawing of the product was 1.3 percent. The salt concentration in the cooked product was a low 0.21 percent, the meat was mushy, and there was a lingering fish odor.

[0040]

[Effect of the Invention] The method of extending meat of the present invention as set forth above consists of injecting salts, alkalis, and thickening stabilizers into meat, thereby affording the advantages of extending the processed meat and preventing the outflow of drippings. /5

[0041] In a preferred mode of the present invention, the salts, alkalis, and thickening stabilizers are injected in solution

form, either individually or as a mixture, thus affording the advantage of extending meat rapidly and efficiently in addition to the above-stated effects.

[0042] In another preferred mode of the present invention, the salts, alkalis, and thickening stabilizers are employed with specific desired components, affording the advantage of further enhancing the above effects.

[0043] In yet another preferred mode of the present invention, the method of extending meat of the present invention consists of incorporating the salts in a solution concentration of from 0.5 to 3 mol/kg, the alkalis in a solution concentration of from 0.1 to 0.5 mol/kg, and the thickening stabilizer in a weight ratio of 0.1 to 0.5 relative to the weight of the meat, affording the advantage of further enhancing the above effects.

[0044] In yet another preferred mode of the present invention, the method of extending meat of the present invention consists of incorporating seasonings, spices, fragrance materials, masking agents, fats, oils, albumin, or animal and plant proteins as supplementary materials, affording the advantage of permitting cooking without adding supplementary materials when cooking the processed meat obtained in addition to the above-stated effects.

[0045] In yet still another preferred mode of the present invention, the method of extending meat of the present invention extends the weight of processed meat by 25 to 150 percent over the weight of the starting material meat. Thus, the major

advantages of a large reduction in calories per unit weight of the meat and low cost production are afforded over processed meat to which the above extending components have not been added. Accordingly, the processed meat obtained by the method of the present invention is suitable as a low-calorie product, providing a food having the full mouthfeel of meat but being low in calories to people who need to limit their intake of calories.